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ABSTRACT

This document presents the scientific diving training course organized by the Arab League Educational, Cultural and Scientific Organization (ALECSO) for the Program for Environmental Studies, Red Sea and Gulf of Aden (PERSGA). This course of six weeks duration aims to produce a person who is capable of carrying out scientific diving tasks in the range of zero to forty meters with complete safety. A description of the syllabus and the time schedule are presented. The publication also presents information for medical offices, equipment requirements and their costs. (HM)

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THE ARAB EDUCATIONAL CULTURAL
AND SCIENTIFIC ORGANIZATION

109, Tahrir Str. - Dokki-Cairo
A. R. Egypt

Red Sea & Gulf of Aden Programme
PERSGA

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
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SCIENTIFIC DIVING TRAINING COURSE

SE 024 786

SCIENTIFIC DIVING TRAINING COURSE

The aim of the course is to produce a person who is capable of carrying out scientific diving tasks in the range of zero to forty (0-40) metres with complete safety. During the course there will be training in the correct use of small boats for diving purposes and in the uses of photography as an aid to scientific data recording.

The course of six weeks duration will be in the English Language and will cater for twelve persons who must fulfil the following prerequisites:-

1. Swimming ability:
   a) A 300 metre swim without stop.
   b) A 15 metre underwater swim without surfacing.
   c) The ability to float for 30 minutes.
2. Submit to a medical examination as on enclosed sheet form (A).
3. Accident insurance to cover diving and boating accidents while on the course.

The course will be in five parts as follows:-

1. Training in the use of mask, fins and snorkel (snorkelling technique).
2. Basic training in the use of compressed air diving equipment (S.C.U.B.A.).
3. Training dives under supervision to gain experience.
4. Advanced techniques including boat handling for diving, deep rescue techniques, night diving and underwater photography.

5. Scientific underwater work using techniques learned on the course.

Training will be carried out by means of lectures followed by practical underwater drills and exercises under the direct supervision of an instructor.

The lecture course is as follows:-

A) Snorkelling techniques

1. Choice and use of basic equipment (mask, fins, snorkel).
2. Circulation and respiration - hypoxia, anoxia and drowning.
3. Ancilliary equipment - ears and sinus.
4. Wet suits, their use and maintenance- exposure and exhaustion.
5. Rescue and resuscitation techniques using basic equipment.

B) Diving techniques

6. Physics of diving.
7. Principles of S.C.U.B.A. and regulator
8. S.C.U.B.A. use and buoyancy control.
9. Lifejackets and their use and maintenance - barotrauma and ascents.
10. Compressors, tank filling and decanting procedures.
11. Open water diving techniques.
12. Decompression sickness - avoidance and rules.
13. Nitrogen narcosis - Oxygen, carbon monoxide and carbon dioxide poisoning.
14. Deep diving procedures and problems.
15. Rescue and resuscitation techniques using S.C.U.B.A.

C) Advanced techniques

16. Principles and treatment of decompression sickness.
17. Search methods and roping techniques.
18. Low visibility and night diving.
19. Navigation and chart work, tide tables.

20. Organisation of diving expeditions: safety and emergency procedures.
21. Adaptation of diving to scientific work.
22. Deep rescue techniques - practical aspects and dangers.
23. Boat handling techniques.

D) Photographic techniques

24. Basic principles of the camera and film.
25. Camera use underwater,
26. Specialised aspects of underwater photography.
27. Night photography.
28. Photographic laboratory procedures for underwater work.

SYLLABUS

WEEK ONE

	9.00-10.00	Introduction to the course.
DAY 1	10.30-1.00	Tour of the Marine Center and the Jordan coastline.
	3.30- 4.30	Lecture 1.
	9.00-10.00	Lecture 2.
	10.30- 1.00	Snorkelling Lesson 1; Fining techniques,
DAY 2		surface diving and treading water.
	3.30- 5.30	Consolidation of mornings techniques.
	9.00.10.00	Lecture 3.
	10.30- 1.00	Snorkelling Lesson 2; Snorkelling without
DAY 3		mask, surfacing techniques.
	3.30- 5.30	Consolidation of previous training.
	9.00-10.00	Lecture 4.
	10.30. 1.00	Snorkelling lesson 3; Techniques with 3kg.
DAY 4		weightbelt, rescue and towing techniques.
	3.30- 5.30	Consolidation of previous training.
	9.00-10.00	Lecture 5.
DAY 5	10.30-1. 00	Open water snorkelling techniques.
	3.30- 5.30	Final Snorkelling Test. See Form B.
DAY 6		Snorkelling expedition to selected areas on coast.

WEEK TWO

DAY 1	9.00.10.00	Introduction to the diving training course.
	10.30- 1.00	Introduction to the water with S.C.U.B.A. equipment - Finning and breathing.
	3.30- 5.30	Consolidation of mornings work.
DAY 2	9.00-10.00	Lecture 6.
	10.30- 1.00	Training drills - mask and mouthpiece. Clearing and snorkelling with tank.
	3.30- 5.30	Consolidation of previous work.
DAY 3	9.00-10.00	Lecture 7.
	10.30- 1.00	Training drills - removal and refitting of tank, finning with tank off and exercises without mask.
	3.30- 5.30	Consolidation of previous work.
DAY 4	9.00-10.00	Lecture 8.
	10.30- 1.00	Training drills - removal of tank, surfacing and dive to refit tank, surfacing drills and snorkelling with tank on surface.
	3.30-5.30	Consolidation of previous work.
DAY 5	9.00-10.00	Lecture 9.
	10.30- 1.00	Training drills - sharing of regulator between two divers, same without mask, finning with blacked out mask.
	3.30- 5.00	Consolidation of previous work.
DAY 6	9.00-10.00	Lecture 23.
	10.30-1. 00	Practical work in boats with emphasis on their use for diving operations.
	3.30 -5.00	

WEEK THREE

DAY 1	9.00-10.00	Lecture 11.
	10.30- 1.00	Training drills - entry and exit procedures from boats, shore and jetty. Further snorkelling exercises with tank. Ascents and sharing of air procedures.
	3.30- 5.30	Consolidation of previous work.
DAY 2	9.00-10.00	Lecture 15.
	10.30- 1.00	Rescue and towing techniques using S.C.U.B.A.
	3.30- 5.30	Consolidation of previous work.
DAY 3	9.00-10.00	Lecture 12.
	10.30- 1.00	Practical work with the lifejackets buoyancy control, emergency procedures and safety aspects.
	3.30- 5.30	
DAY 4	9.00-10.00	Lecture 13.
	10.30- 1.00	Perfecting all of the basic exercises.
	3.30- 5.30	
DAY 5	9.00-10.00	Lecture 14.
	10.30- 1.00	Final test of practical work.
	3.30- 5.30	Theoretical examination.
DAY 6	9.00-10-00	Lecture 10.
	10.30- 1.00	Practical work on compressor maintenance,
	3.30- 5.30	operating procedures and tank filling.

WEEK FOUR

	9.00-10.00	Lecture 16.
DAY 1	10.30- 1.00	Open water dive - Lifejacket training.
	3.30- 5.30	Open water dive - Lifejacket training.
	9.00.10.00	Lecture 17.
DAY 2	10.30- 1.00	Open water dive - Search methods
	3.30- 5.30	Open water dive - Rope diving.
	9.00-10.00	Lecture 18.
DAY 3	10.30- 1.00	Open water dive.
	NIGHT	Night dive in shallow water.
	9.00-10.00	Lecture 19.
DAY 4	10.30- 1.00	Open water dive.
	3.30- 5.30	Open water dive.
	9.00.10.00	Lecture 20.
DAY 5	10.30- 1.00	Open water dive - Simulated emergency procedures.
	3.30- 5.30	Open water dive - Simulated emergency procedures.
	9.00.10.00	Lecture 21.
DAY 6	10.30. 1.00	Open water dive.
	NIGHT	Night dive.

WEEK FIVE

	9.00010.00	Lecture 22.
DAY 1	10.30- 1.00	Open water dive - Deep rescue techniques
	3.30- 5.30	Open water dive - Rescue and towing practice.
	9.00-10.00	Lecture 24 and 25.
DAY 2	10.30- 1.00	Underwater photo techniques - a slide show.
	3.30- 5.30	Practical work underwater using cameras.
	9.00-10.00	Lecture 26.
DAY 3	10 30- 1.00	Practical underwater photographic work.
	3.30- 5.30	Practical underwater photographic work.
	9.00.10.00	Lecture 27.
DAY 4	10.30. 1.00	Practical underwater photographic work.
	3.30- 5.30	,, " "
	9.00.10.00	Lecture 28.
DAY 5	10.30- 1.00	Laboratory photographic work.
	NIGHT	Photographic night dive.
	Morning	Practical examination.
DAY 6	AFTERNOON	Theoretical examination.

WEEK SIX

Daily diving expeditions carrying out scientific work underwater in conjunction with current Marine Station Projects. Special projects will be organised to allow the trainees to use the maximum number of underwater scientific techniques.

On completion of the course each traines will be given a record (logbook) of his training and diving experience.

Here must be the possibility for the trainee to cease his training if he feels that he is not suited to diving or is afraid to continue. To force an unwilling trainee means the risk of a serious diving accident. Each stage of training therefore must be voluntary.

MEDICAL CERTIFICATE. CODE OF PRACTICE FOR SCIENTIFIC DIVING

INFORMATION FOR MEDICAL OFFICERS

Particular attention should be paid to the ENT nd Respiratory Systems. It must be borne in mind that diving may involve moderately sever exercise under adverse conditions. The Safety of the candidate and others depends on his physical and psychological fitness.

System	Disqualifying Factors	Allowable Factors and Other Points.
General	Gross obesity. Impaired exercise tolerance.	
E.N.T.	Perforated eardrums Chronic otitis media or mastoid operation.	Healed perforation successful tympanoplasty. Unilateral nasal block. Sinusitis if not adversely affected by diving (but not if of infective ongen). Valsalva test of drum mobility optional and out weighed by practical diving test.
Oral Cavity	Dentures must be retained in place on fully opening the mouth and not be dislodged by placing jaws together in any position, or by movement of one denture against the other they should extend to the muco-buccal fold. Applicants should be advised about bad teeth and fillings No firm advice as to whether an individual should or should not wear his dentures when diving is possible.	
Respiratory.	Any chronic lung disease past or present (see opposite) History of pneumothorax Emotionalry-induced asthma.	Mild chronic bronchitis (smoker?) without emphysema of important airways obstruction if exercise tolerance. spirometry and CXR normal. Healed primary focus tuberculous scars in established divers or new recruits. Bronchial asthma. if clinically normal between attacks. and exercise tolerance normal. Full-plate CXR required.
Cardio-vascular	Heart disease. Hypertension Systolic B.P. over 150mmHg. Diastolic B.P. over 100mmHg.	Minor asymptomatic heart disease other than ischaemic following specialist referral and approval. Varicose veins (but if severe. caution against use of dry suit).

Abdomen	Proteinuria until cause established.	Peptic ulcer, unless unduly active or troublesome.
G.U.S.	Gross abnormalities of renal tract. Pregnancy.	Abdominal hernias(but advise repair).
Limbs	Disease, amputation or deformity excessively limiting ability to swim. (Specialist referral is advisable).	Arthritis or arthrodesis not markedly limiting ability to swim or rescue others.
Endocrine: Insulin-requiring diabetes.		Diabetes not requiring insulin, well-controlled and entirely free from hypoglycaemic attacks of cardio-vascular complications.
Central Nervous System	Epilepsy, including post-traumatic fits. Cranial surgery. Any serious head injury in the past two years.	

Exercise Tolerance:

A candidate must not fail to pass the following simple test:

After stepping up onto a chair 5 seconds. the pulse rate should returnto the pre-exercise level in 45 seconds.

MEDICAL CERTIFICATE. CODE OF PRACTICE FOR SCIENTIFIC DIVING

Name: Address:

Date of Birth:

Number of years diving:

PART 1. TO BE PUT TO THE CANDIDATE BY THE EXAMINING DOCTOR

Have you suffered at anytime from any of the following? Answer YES or No. If YES. give details in space at bottom of page.

1. Earache. or ear discharge----------
2. Sinus trouble. Nosebleeds. Hayfever----------
3. Any lung disease. bronchitis or asthma ----------
4. Disease of the heart circulation including high blood pressure ----------
5. Fits. recurrent headaches or any nervous disorder -------
6. Blackouts or fainting attacks ----------
7. Diabetes ----------
8. Peptic ulcer; hernia ----------
9. Do you wear dentures? ----------
10. Do you smoke ? ----------
11. Have you any physical disability or abnormality? --------
12. Have you ever been admitted to hospital? ----------

If YES, for what reason ? ----------

13. Are you taking (or recently taken) any tablets or any treatment?----------
14. Any diving injury. including damaged ear drums, decompression sickness, etc? ----------
15. Date of last medical examination ----------
16. Date of last Chest X-Ray ----------

Details: ----------

I declare the above answers to be true and that I have omitted nothing that might be relevant to my fitness for diving.

Signature: ---------- Date:----------

MEDICAL CERTIFICATE. CODE OF PRACTISE FOR SCIENTIFIC DIVING

PART 2. TO BE COMPLETED BY EXAMINING DOCTOR

Height: ---------- Weight: ----------Kg.

Ears:R Drum ---------- Canal --------- Valsalva---------

L Drum ---------- Canal --------- Valsalva---------

Sinuses: ----------

Teeth and gums ----------

Chestmovements ----------

Lung Fields ----------

Heart sounds ----------

Pulse ---------- Blood pressure ---- Apexbeat -------

Abdomen ---------- Hernial orifices----------

Central Nervous system: ----------

SPECIAL INVESTIGATIONS

1.Full Plate Chest X-Ray ----------

2.Exercise tolerance:----------

3.Urine Sugar---------- 4. Peak Expiratory Flow:

(if available)

Albumen ----------

Blood ----------

Ketones ----------

Facilities allow the following are recommended in addition:

---

1. Exercise EGG: ----------

2. FEV: ---------- FVC: --------- FEV,/FVC:--------

REMARKS : ----------

CERTIFICATE OF FITNESS

To my opinion the candidate is fit to carry out scientific or amateur diving activities:

Signature: ---------- Qualifications: ----------

Date: ----------

Address: ----------

FINAL SNORKELLING TEST

1. Sink basic equipment in three metres of water, dive for each item and fit in position.

2. Fin two hundred yards, surface diving every twenty- five metres.

3. Perform three forward rolls and three backward rolls.

4. Fin for fifteen metres underwater.

5. Hold breath for thirty seconds underwater.

6. Fin fifty metres wearing a five kilogram weightbelt.

7. Release weightbelt in three metres of water; remove mask.

8. Fin fifty metres, face submerged, without mask.

9. Dive for weightbelt, refit and fin a further fifty metres.

10. Tow a diver fifty metres incorporating E.A.R. (mouth to mouth resuscitation); land the body and continue E.A.R.

11. Fin five hundred metres.

12. Surface dive and descend to seven metres.

EQUIPMENT REQUIREMENTS

A) Compressor

One 400 l/min air compressor, working pressure 250 BAR, driven by electric motor. Complete inventory of spare parts and accessories. - 2000 JD

B) Diving Equipment

Mask	14 units (for 12 trainees & 2 instructors)	55	JD
Fins	14	55	
Snorkels	14	28	
Waight belts	14	42	
Knives	14	55	
Compressed air tanks	14	700	
Regulators	14	350	
Life jackets	14	550	
Depth gauges	14	140	
Wetsuits	14	420	
Underwater lamps	14	280	
Tank pressure gauges	2	18	
Complete spare parts and special tools		300	

C) Underwater photographic equipment

3	Nikonos underwater cameras with 28 mm lens	350	
3	Nikonos underwater cameras with 35 mm lens	600	
6	Underwater light meters	150	
6	Underwater electronic flash units	800	
	Sub Total	6693	JD
	Equivalent to $	20079	

D) The following diving equipments from La Spirotechnique, 114 Rue Marius Aufan, 92306 Levallois - Perret, France.

Quantity		Ref. No.	Cost $
20	Masque Bella	151.100	130
2 Pair	Spirofin Reglable 39/42	153.609	40
2 "	" " 43/48	153.610	40
2 "	Palmes Otaric Reglable 41/46	153.000	30
20	Tuba Spiro nu	152.116	30
10	Boucle de ceinture	154.057	60
100m	Sangle nylon de 42	128.505	210
20	Mousqueton	154.083	90
2	Profondimetre Delta 0-80m	142.160	75
2	Manometre de controle	129.350	60

Quantity		Ref. NO		Cost $
	Combinaison SPIRO TRAME LUX unepiece cagoule attenante.	640.101		
2	" " "	Taille	1	300
5	" " "		2	750
5	" " "		3	750
2	" " "		4	450
	Bottillons blongee avec semelle SPIROJ 4.5mm	679.100		
2Pr.	" "	Taille	2	40
5Pr.	" "		3	90
5Pr.	" "		4	90
1	Clapet Monte. Cat. No. 122 735			1.14
2	Ressort reserve. Cat. No. 122 736			0.50
12	Bague R 7. Cat. No. 411307			4.4
1	Ressort. Cat. No. 141929			0.75
3	Bague R 7815. en PB 701. Cat. No. 415207			1.15
2	Clapet. Cat. No. 129355			3.18
2	Mosquetons Cat. No. 141973			1.004
6	De De 30mm. Cat. No 128513			3.21
3	Bride. Cat. No. 121204			13.06
3	Vis de bride. Cat. No. 121227			2.26
3	Poignee. Cat. No. 121207			6.03
6	Cale neoprene. Cat. No. 121211			0.5
6	Sangle superieur monte. Cat. No. 121226			36.16
15	Sous cutale au metre. Cat. No. 121222			16.30
6	Plague de firme. Cat. No. 113235			7.33
3	Clupet non garni. Cat. No. 113248			8.69
3	Ressort. Cat. No. 113238			1.41
4	Ecroude 3. Cat. No. 113285			0.19
1	Levier. Cat.No. 113247			0.47
3	Corps. Cat. No. 113223			30.52
10	Collier Minox. Cat. No.113293			5.48
10	Flexible au metre. Cat. No. 114142			25.83
20	Bague R.5 Cat. No. 128115			1.65
10	Joint presse etoupe. Cat. No. 128112			0.83
2	Tige 2 PANS. Cat. No. 128113			1.004
2	Carre guide. Cat. No. 128128			0.5
2	Olive clapet. Cat. No. 128127			2.14
100	Joint O Sortie bague R9 Cat. No. 128157			10
6	Joint Robinet R19. Cat. No. 128158			1.004
20	Vis clapet. Cat. 128107			32.13
2	Cardan. Cat. No. 128109			0.87
3	Tige 4 Pans. Cat. No. 128110			1.71
3	Tige 2 Pans. Cat. No. 122754			2.76
1	Cale. Cat. No. 122739			0.25
10	Saogle de masque, Cat. No. 151158			7.07
10	Brides spiro fin. Cat. No. 153612			16.96
20	Table plongee club. Cat. No. 142501			15.65
5	Bidon huile de 1 L oil jet 11. Cat. No. 312566.			34.78

Quantity		Cost $
1	Turbine du volant. Cat. NO. 312629	82.17
10	Lague styrenne jaune. Cat. No. 607123	62.61
15	Lilvant. Cat, No. 607124	34.63
6	Tube de colle. Cat. No. 690050	7.76
25	Bande collante jaune de 60 (le metre). Cat. No. 690061.	24.35
25	Bande collante jaune de 10 (le metre) Cat. No. 640059.	11.41
24	Filtre. Cat. No. 111311	7.51
12	Circlips. Cat. No. 111312	6.57
3	Diaphragme. Cat. No. 113201	1.45
3	Rondelle. Cat. No. 113207	0.70
1	Pointeau. Cat. No. 113222	0.94
6	Baque R 5A. Cat. No. 113278	1.41
3	Clapet Garni. Cat. No. 113218	7.04
1	Ressort. Cat. No. 113203	0.47
2	Rondelle. Cat. No. 113284	0.54
10	Bague R1. Cat. No. 111314	2.35
2	Bague R11. Cat. No. 114131	0.31
3	Bague R7. Cat. No. 411307	1.1
		Subtotal $ 3872.59

Total $ 23,861.59 plus travel expenses, per diem and expenses of teaching staff.